

United States Army School of Aviation Medicine
Fort Rucker, Alabama
December 2004



LESSON PLAN

TITLE: AVIATION PROTECTIVE EQUIPMENT

FILE NUMBER: U3004526-1

PROPONENT FOR THIS LESSON PLAN IS:

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Aviation Protective Equipment Orientation
U3004526 / Version 1
13 DEC 2004

Prerequisite Lesson(s)

<u>Lesson Number</u>	<u>Lesson Title</u>
None	

Clearance Access

Security Level: Unclassified
 Requirements: There are no clearance or access requirements for the lesson.

Foreign Disclosure Restrictions

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References

<u>Number</u>	<u>Title</u>	<u>Date</u>	<u>Additional Information</u>
AR 670-1	Wear and Appearance of Army Uniforms and Insignia	01 Sep 1992	
AR 95-1	Flight Regulations	01 Sep 1997	
FM 1-301	(SS/FM 3-04.301, 29 SEP 00) Aeromedical Training for Flight Personnel	29 May 1987	
STANAG 3204	Aeromedical Evacuation		
TM 10-8400-201-23	General Repair Procedures for Clothing	07 May 1990	

Student Study Assignments

Study student handout and review reference materials listed above.

Terminal Learning Objective

Action:	Employ aviation protective equipment.
Conditions:	While performing as an aircrew member.
Standards:	IAW AR 95-1, AR 670-1, TM 10-8400-201-23, TM 1-8415-216-12&P, and TM 1-8415-215-12&P.

Safety Requirements

None.

Risk Assessment Level

Low - RISK ASSESSMENT LEVEL: Low.

Environmental Considerations

NOTE: It is the responsibility of all soldiers and DA civilians to protect the environment from damage. None.

Evaluation

On the last day of aviation medicine academics, each student will be evaluated on this block with a 50 question examination in which they must answer 35 of 50 questions correctly to receive a passing score. The test will be given in room X110 of Bldg 301.

A. ENABLING LEARNING OBJECTIVE

ACTION:	Identify the safety features provided by an aircraft.
CONDITIONS:	Given a list.
STANDARDS:	In accordance with USAARL Report No. 93-15.

a. Aircraft structural shell (fuselage). The cockpit and cabin should possess sufficient strength to prevent intrusion of structure in occupied spaces during a survivable crash. The floor and nose of the aircraft should be of a design which reduces plowing or scooping of earth during crashes which could decrease stopping distances resulting in higher decelerative forces.

b. Landing gear and crashworthy seats. Newer Army rotary wing aircraft (UH-60/AH-64) rely heavily on fixed landing gear and seats to attenuate crash forces. Fatalities are rare for vertical impacts up to approximately 15.2 meters per second (50 ft/sec). Maximum landing loads for the UH-60 is 540 ft/min (11.25g) under normal conditions.

c. Personnel restraint system. To survive an impact, only to then be injured or killed due to ejection from the aircraft would be terrible. Studies indicate that contact injuries (secondary impacts) occur 5 times as often as acceleration injuries. Therefore personal restraints should be tight as to inhibit contact with objects in the cockpit, i.e. cyclic. Equipment should also be tied-down securely to prevent being thrown into crew members.

d. Post-crash factors. Army aircraft offer protection from thermal injuries several ways. Crashworthy fuel systems; self sealing fuel cells, break free self sealing fuel lines, and fire extinguishing systems in the engine compartment and personal fire extinguishers in the cockpit (for personnel). Protection from drowning is primarily provided through training of the crewmember (water survival training); also, special equipment is required during over water missions: personal flotation devices (water wings), and rafts.

B. ENABLING LEARNING OBJECTIVE

ACTION:	Identify the characteristics and wear of flight clothing.
CONDITIONS:	Given a list.
STANDARDS:	IAW AR 95-1, AR 670-1, TM 10-8400-201-23, TM 1-8415-216-12&P, and TM 1-8415-215-12&P.

a. A functional aviation protective equipment ensemble is determined not only by proper care and maintenance techniques, but also by proper wear of the equipment.

b. Under-garments. Wear cotton, wool or NOMEX underwear when performing crew duties per AR 95-1.

c. NOMEX flight suits (either the one piece, sage green or the Aviation Battle Dress Uniform) are flame resistant garments. The flame resistant properties are inherent of the polymer chemistry; it will not diminish during the life of the fiber. This flexible polymer chain gives NOMEX more textile-like qualities while retaining high temperature properties similar to KEVLAR.

(1) Characteristics:

(a) Does not support combustion but chars at approximately 700^o-800^o F (370^oto430^o C).

- (b) Does not melt or drip.
- (c) Good chemical resistance.
- (d) NOMEX is more durable than cotton and resists abrasion.
- (e) Low fiber shrinkage.
- (f) Low thermal conduction.
- (g) Comfortable to wear.

(2) Wear.

- (a) Collar is one piece which is worn up while flying
- (b) Sleeves must be worn down and Velcro tabs secured during flight.
- (c) Uniform should be loose fitting to prevent thermal burns due to tightness. Size and fit should completely cover all skin not covered by gloves, helmet and boots. Best protection is provided by two layers of clothing (NOMEX over NOMEX, cotton, or wool).

d. Identification tags.

- (1) Required when flying.
- (2) Avoid plastic covers/liners which could cause burns if the plastic melts.
- (3) ID tag chain should be worn around outside of collar and tucked between blouse and T- shirt.

e. Boots.

(1) Characteristics

- (a) Retention during high G-forces to include crash or ejection.
- (b) Stability to prevent ankle and foot injury which could compromise aircraft escape.
- (c) Fire retardancy of leather boots is greater than jungle boots.

(2) Boot wear.

- (a) The boots must be laced up fully to the top.
- (b) Avoid boots with zippers, straps, and jungle boots. Zippers will transfer heat, straps will give or even break and jungle boots will melt.

f. NOMEX flight gloves.

- (1) Flight gloves are designed for comfort, insulation during a fire, and sensitivity to identify an object by touch.

(2) Flight Gloves must be worn at all times during flight or when engaged in flight activities.

(3) Gloves are to be worn under the sleeves of the NOMEX flight suit. If a watch is worn, it should be worn outside of glove.

g. Flight helmets.

(1) Sound Protective Helmet-4B (SPH4B).

(a) Characteristics:

1. Provides both crash protection and noise attenuation.
2. Superior to all preceding helmets.
3. Custom fit by local aviation life support equipment (ALSE) technician by heating or removing thermal plastic liners (TPL).
4. Dual visor provides eye and face protection day or night.
5. Designed to provide better retention if the chin strap and nape strap are tight.

(b) Wear:

1. Use visor except during night vision goggle flights or when using target acquisition equipment.
2. Always ensure both chin and nape straps are tight prior to flight.

(1) Head Gear Unit-56P (HGU-56P), replacement for the SPH-4B.

(a) Characteristics:

1. Constructed of graphite and SPECTRA®, a thicker less dense, energy absorbing liner. This helmet provides greater impact protection than previous helmets. Also has an upgraded retention system.
2. Sound attenuation better than SPH-4B.
3. Custom fitted by an ALSE technician.
4. Dual visors, comparable to the SPH-4B, and detachable face guard.
5. Chin and nape pad/strap for better retention. Always ensure both are tight prior to flight.
6. Platform of the future for all aviation headgear.

C. ENABLING LEARNING OBJECTIVE

ACTION:	Identify the maintenance procedures for flight clothing.
CONDITIONS:	Given a list.
STANDARDS:	IAW TM 10-8400-201-23 and TM 1-8415-216-12&P, and TM 1-8415-215-12&P.

a. Avoid wearing flight suit during routine ground duties due to possible contact with grease, oil, paint, glue, and other combustible materials.

- (1) Reduces fire retardancy.
- (2) Reduces breathing qualities of the garment.

b. Cleaning.

- (1) Wash at temperatures less than 180°, and rinse completely to remove soap film.
- (2) Fabric softeners may be used in the rinse cycle to remove body oils. The fabric softeners will also serve to inhibit static generation.
- (3) Do not use any type of bleaching compound in laundering
- (4) Do not starch. In the event that the uniform is inadvertently starched, restore the fire resistance to its original state by rinsing the garment in warm water.
- (5) Drying temperature should not exceed 180°.
- (6) Ironing on the Permanent Press setting, medium temperature, can be done, but do not iron the Velcro tabs. Wrinkles, however, are hard to remove from NOMEX due to its high temperature resistant quality.
- (7) Commercial dry cleaning may be used.
- (8) The jackets and hood should be commercially dry cleaned only.

c. NOMEX flight gloves can be washed with mild soap and water while gloves are on your hands, or in a washer.

- (1) Washing temperature should not exceed 120°. Do not bleach or starch.
- (2) Remove excess water by squeezing gloves or rolling them in towel. Do not wring or twist. Stretch gloves into shape and hang or lay flat to air dry. Do not tumble dry, or expose wet gloves to heat or direct sunlight.

d. HGU-56P.

- (1) Clean outer helmet and visors with warm soapy water and soft cloth. Remove the TPL to clean the liner.
- (2) Modifications may be made only by ALSE technicians.
- (3) Inspect helmet, each time it is used, for loose or worn parts, frayed straps, and

cracking of the outer shell.

(4) Do not sit on helmet.

(5) Do not place objects in the helmet which can damage the protective qualities of polystyrene lining and TPL.

D. ENABLING LEARNING OBJECTIVE

ACTION:	Identify the miscellaneous apparel that is safe and unsafe.
CONDITIONS:	Given a list.
STANDARDS:	IAW AR 95-1 and AR 670-1.

a. Metal jewelry and watches can be dangerous when working on the aircraft, near battery terminals, or exposed wiring connection.

b. Metal insignia can contribute to injuries during a crash sequence or due to electrical short circuits. Foreign objects damage can be caused by the fastener on back of the insignia. Insignia and badges on ABDUs will be sewn on.

c. Issued sun glasses are for use during the day when night flight is anticipated. Glasses are not a substitute for visors.